Reprinted from *The Indian Medical Gazette*, Vol. XXXV
(No. 12, Dec. 1900).

CAPTAIN ROGERS' RECENT INVESTIGATION ON MALARIA.

By RONALD ROSS,
MAJOR I.M.S. (RETD.), *Liverpool*.

An abstract of Captain Rogers' recent epidemiological investigations on malaria was published in the *Indian Medical Gazette* for September. It is certainly an interesting paper, though it can scarcely be said to yield reliable conclusions. Captain Rogers examined the spleens of over 5,000 persons in the districts north of Calcutta and found that the percentage of persons with enlarged spleen was considerably smaller in the riverine villages than further inland, and was also much less in villages supplied with filtered drinking water than in the others. From this he concludes that there is "a very definite relationship between the drinking water and the amount of malaria, as judged by the spleen-rate in this alluvial area."

If these observations are confirmed by much more extensive investigations carried out in various parts of the world, they will tend to show that enlargement of the spleen is favoured

22500309243

by impure drinking water; but they will certainly not, by themselves, prove anything else. The mistake made by Captain Rogers is to suppose that the spleen-test is an accurate measure of the amount of malaria, pure and simple, in a locality As a matter of fact enlargement of the spleen is a mere syndrome of malaria, which is largely affected by race, for instance, and possibly by other adventitious circumstances—such, let us say, as drinking water. Suppose for argument that this were actually the case, Rogers' conclusion would at once be vitiated. Can he show that it is not actually the case ? In considering a question of such difficulty as that whether malaria is produced by other means than by mosquitoes, all possibilities must clearly be taken into account.

Consider some facts, for example. My regiment, the 19th M. I., at Secunderabad, suffered severely from fever in 1897. I used to spend the whole day in hospital studying the cases, and am quite certain of the fact. Yet, on an occasion when I was called upon to examine the spleens of the whole regiment for the purposes of an official report, I was astonished to find that, so far as I remember, not more than half a dozen of the men possessed enlarged spleens. I daresay the report can be still unearthed from the regimental archives—it was dated about August 1897, I think. In this case then Captain Rogers with his spleen-test would have declared the regiment free from malaria.* Again, in the Wilberforce barracks at Freetown, Sierra Leone, we actually found parasites in a quarter of the men taken at random. Yet very few of them had enlarged spleen. Indeed in

* The regiment drank unfiltered well-water.

the whole of Freetown, which has a perfect pipe-water supply obtained from mountain sources, there is very little enlarged spleen, though the place is a deadly one. In short, Rogers' researches do nothing more than fall in with a suspicion which many of us have held, that this syndrome is due to *something* plus malaria. I would advise consulting Daniels' careful work on the subject. Then, again, it must always be remembered that the enlarged spleen is an evidence rather of past malaria in the patient than of present malaria—compare, for instance, my *kala-azar* report. Lastly, innumerable instances have shown in many parts of the world (for example Freetown, and towns in Italy—compare Bignami) that malaria is *not* given by drinking water.

Rogers further adduces the admission rates in local dispensaries in favour of his statistics. But surely no one can have faith in such evidence! The popularity of the dispenser—anything—will affect these rates. As to comparing them with changes of season, he seems to forget that in localities when almost every one is infected from early childhood, the admissions may depend more on relapses due to wettings during sudden showers and similar causes than to fresh infections. Thus any military surgeon can observe that a route-march immediately brings on fever amongst a number of his soldiers! Does the route-march cause infection? The fact is that owing to the long-continued nature of a malarial infection, its numerous modifications and its relapses due to all kinds of causes, there is no disease in which statistics, epidemiological researches, ground-water estimates and so on are more likely to lead to error, and such are never very satisfactory methods of enquiry.

To prove that malaria is carried by any other medium than by mosquitoes, the germs must be found in that medium ; or the disease must be actually produced by it under experimental conditions ; or both must be done. Nothing else is likely to satisfy experienced pathologists nowadays.

The true test of what Daniels calls the *malariosity* of a place is certainly not the spleen-test, but depends on the average length of time which elapses before an immigrant into that locality contracts the disease. I always warn men against undertaking medical researches ; but since Captain Rogers shows so much enthusiasm in this cause, he may permit me to suggest a modification which will probably make his investigations more useful. He should examine those commonest of immigrants, the local babies—as has been done with such effect by Koch, Christophers and Stephens (Royal Society Reports). He should compare the age of these at which the parasites begin to appear ; the age at which they disappear ; the corresponding enlargement of spleen ; the percentage of local *anopheles* infected ; and the conditions of environment. And, if I may make another suggestion, actuals rather than ratios should be given in his statistics, so as to enable the reader himself to judge regarding the value of each observation.

Rogers' finding *anopheles* larvæ in tanks and pools with fish in them is interesting. Evidence on the point is somewhat conflicting ; and it is possible that the species of insects concerned may have to do with their habits in this respect. Rogers seems to think that I have laid it down as a law of universal application that *anopheles* never breed in tanks. If he will read my writ-

ings more closely he will find that in discussing the bionomics of gnats I have spoken from my own limited experiences only. In India my investigations were not exhaustive; while in Freetown there are hardly any large ponds with fish, and in these there were no larvæ. I know nothing of what may happen in places where I have never been.

The habit of imputing to a writer opinions which he has never expressed and has indeed often disclaimed, and of then demonstrating simultaneously the folly of these opinions and of the writer for holding them, is one to be guarded against. I have really never expressed the "ingenious suggestions," which Captain Rogers seems to think I have, regarding the possibility of exterminating anopheles from, let us say, the whole of Bengal! The utmost I ventured to suggest was that it might be possible to exterminate them from *some* large towns, cantonments and plantations, *under favourable conditions.* So I think it is; but I have always expressly excluded *large rural areas* from this suggestion. The idea that vast tracts, peopled only with natives, can be freed from any mosquitoes is too silly even to require a disclaimer.

WELLCOME INSTITUTE LIBRARY
Coll. welMOmec
Coll. pam
No. WC 750
1900
R 82 c